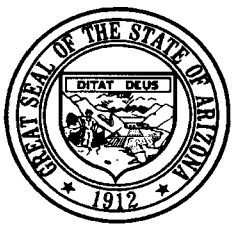
CHAPTER

12

Future Directions



12.1 INTRODUCTION

The "Future Directions" chapter provides an overview of water management issues which need to be addressed in the AMA and the Arizona Department of Water Resources' (Department) perspective on management approaches. This chapter also provides an overview of the future actions the Department proposes to address these issues.

The 1994 legislation establishing the Santa Cruz Active Management Area (AMA) called for the development of a comprehensive and well-balanced management strategy reflecting the unique goal and nature of the AMA. The legislature recognized three principal factors which make the AMA unique: (1) the goals of the community to protect the limited water resources of the AMA as well as the diverse habitat along the Upper Santa Cruz River, (2) the international nature of the water management issues facing the region, and (3) the need for coordinated management of surface water rights and groundwater rights to meet the management needs of the area.

In the development of the Third Management Plan, the AMA builds upon programs developed during the First and Second Management Plans and incorporates some new programs to help achieve the AMA goals. Additional programs will be developed in order to ensure the AMA continues to maintain safe-yield conditions and prevent long-term local water table declines. Some of these programs, such as future amendments to the Assured Water Supply Rules (AWS Rules) and adoption of additional well spacing criteria unique to the AMA, are already authorized by statute and are currently under development. However, development of other potentially necessary programs may be constrained by the Department's staff resources, legal authorities, and the degree of public support for the proposed programs.

Some of the water management issues and potential program concepts discussed in this chapter may fall outside of the Department's responsibility or authority. However, a comprehensive overview in this "Future Directions" chapter is an important contribution to meeting the water management challenges of the future.

12.2 A PERSPECTIVE ON WATER MANAGEMENT IN THE SANTA CRUZ ACTIVE MANAGEMENT AREA

The third management period is a turning point in water management for the Santa Cruz AMA, in that the provisions of the Groundwater Code (Code) are being reexamined to determine if adjustments need to be made to better correlate to the unique goals of the AMA. The separation of the Santa Cruz AMA from the Tucson AMA brings about the Santa Cruz AMA's own development plan. In this plan, criteria for assured water supply consistency with goal and well spacing rules are more closely tailored to the needs of the AMA.

Critical issues currently facing the AMA include the development of programs to assure sustainable water supplies, the settlement of surface water rights claims, the facility planning process for the treatment and disposition of wastewater from both sides of the border, the protection of core aquatic and riparian habitats, and the sustenance of a healthy economy.

The regulatory function of the initial Third Management Plan in the Santa Cruz AMA is primarily to describe conservation requirements for municipal, industrial, and agricultural users and to prescribe guidelines for the placement of new non-exempt wells. The statute also requires the inclusion of an augmentation program, a conservation assistance program and a groundwater quality assessment. The non-regulatory portions of the plan discuss the development of the AWS Rules and potential modifications to the well spacing rules and recharge program.

12.2.1 Hydrologic Conditions

The dual water management goal of the AMA is to maintain safe-yield conditions and prevent local water table levels from experiencing long-term declines. However, these goals will be an ongoing challenge because local water table levels fluctuate with variations in weather patterns, water withdrawals within the Santa Cruz River basin (in Mexico and in the United States), and incidental recharge from agricultural irrigation and wastewater treatment plant discharge. In order to assure dependable water supplies as the demand for this finite resource continues to grow, active management strategies must be developed. Prior to developing new tools for the Third Management Plan, it is important to have a clear scientific understanding of how natural processes and water systems within the AMA operate.

To improve the understanding of the hydrologic system in the Santa Cruz AMA, a hydrologic model is being developed by the Department. The model will be an important tool in evaluating demand strategies in a hydrologic system with such a high degree of seasonal and annual fluctuation in natural supplies. Data retrieved from this model may also prove useful in refining some of the natural water demand and supply estimates contained in this plan.

12.2.2 Water Demand Conditions

Water demand in the AMA is concentrated in the Younger Alluvium along the main channel of the Santa Cruz River. More than 90 percent of the water production in the AMA occurs in this area. The aquifer systems of the Santa Cruz AMA are generally shallow, with limited storage capacity, and are highly sensitive to prolonged periods of drought. These systems also rebound rapidly when sufficient surface flow allows recharge. The largest portion of the system is also heavily dependent on the continuation of effluent discharge from the Nogales International Wastewater Treatment Plant (NIWWTP) to sustain current water levels.

The water demand characteristics of the AMA are described in more detail in Chapter 3, including maps which illustrate that demand is concentrated within the Santa Cruz River channel or in close proximity. This characteristic, coupled with anticipated growth rates projected to continue well into the future, emphasizes the importance of developing additional water conservation and augmentation programs.

Efficient use of the water supplies is fundamental to achievement of the AMA goals. The Third Management Plan highlights the importance of water conservation in chapters 4, 5, and 6. AMA water supplies are limited and the water demand sectors will need to find innovative ways to maximize the use of the available supplies. The Department intends to be an active participant in this process.

12.2.2.1 Municipal Demand and Issues

Municipal water users in the Santa Cruz AMA are faced with a significant water management challenge in securing additional supplies to serve new growth. Water supplies must be long-term and secure to allow for additional development in the AMA, as in all AMAs. However, the Santa Cruz AMA is unique from other AMAs in that water from three sources (surface water, groundwater, and effluent) is commingled in the Younger Alluvium of the Santa Cruz River. This commingling of water combined with the AMA goal of preventing long-term declines in local water table levels will require a delicate and detailed management approach. The Santa Cruz AMA is also presented with unique problems because it has no access to imported Colorado River supplies.

In 1995 the Department adopted rules governing the issuance of assured water supply determinations. The AWS Rules apply to the Santa Cruz AMA and require that any certificates or designations issued be consistent with the goals of the AMA. However, because the AMA was established after the AWS Rules had been substantially completed, the AWS Rules do not currently include specific criteria for evaluating

the consistency of the proposed use to the AMA goals nor do they include standards for determining physical availability in this unique hydrologic system. While the new criteria are being developed, Department staff will implement the rules on a case by case basis.

Future modifications of the plan may be necessary in order to better coordinate with the AWS Rules consistency with goal criteria when adopted for the Santa Cruz AMA. The municipal Alternative Conservation Program consistency with management goal criteria, specifically, may be more fully developed as the AWS Rules are modified for the AMA. In addition, the well spacing criteria included in this plan will be modified as additional hydrologic information is collected and analyzed and the hydrologic model for the AMA is completed.

Effluent generated by the NIWWTP is one of the most important renewable water supplies in the Santa Cruz AMA. It is fundamental to water management to assure the optimal use of present and future effluent flows. However, there are legal, economical, and governmental barriers that will need to be resolved to maintain or augment the current and projected effluent quantity discharged and maintain a supply which can meet the assured water supply needs of current and future users. Currently, about two-thirds of the effluent discharged to the Santa Cruz River is wastewater generated in Mexico. The Department has been working throughout its participation in the facility planning process to find a mutually beneficial agreement with Mexico to secure continuous effluent flow into the AMA, which will help to maintain water tables, recharge areas of high water demand, and preserve valued riparian habitat. The locally generated effluent is also an important resource that, used efficiently, will help to maintain the AMA goals.

In addition to the needs for water supply augmentation discussed above, the limited supplies available within the AMA necessitate an ongoing commitment to water use efficiency, conservation programs, and drought supply programs for emergency situations. To help efficiently manage water supplies the Department has encouraged the development of water conservation, reuse, and recharge as good water management tools for municipal water providers.

Another water management concern is the proliferation of wildcat subdivisions and lot splits, dry lot subdivisions, and small development creating new small water providers without sufficient resources. Large municipal providers are technically better prepared to implement water conservation, water quality, and reuse programs than are very small providers or the "dry lot subdivisions" where non-regulated exempt wells are used. "Dry lot subdivisions" are housing subdivisions which sell lots that have no access to a water distribution system. Each lot owner is responsible for providing his own water by means of an exempt well.

In addition to the concerns above, wildcat subdivisions, lot splits, and dry lot subdivisions of less than 20 lots are currently exempt from requirements that their use be consistent with management goals of the AMA. As this type of development occurs in the AMA, it can potentially impact water use and water rights closer to the Santa Cruz River and hinder the ability to maintain water levels when new exempt wells intercept the mountain front recharge which historically had replenished the Younger Alluvium.

12.2.2.2 Agricultural Demand and Issues

The agricultural sector is one of the largest water users in the AMA. During the third management period, the Department will provide the agricultural sector with technical and conservation planning assistance to reduce overall demand and help meet the AMA goals. The Department will investigate incentives for the direct use of effluent, and work to increase the accuracy of water withdrawal measurement and improve irrigation scheduling and efficiency.

As one method to increase the irrigation efficiency, the Department will work with agricultural users to develop a program which allows them to maintain their surface water rights without having to periodically over irrigate their fields.

The Department will also work with surface water rights holders to facilitate arrangements which provide drought protection to municipal users by compensating senior surface water rights holders who fallow their land during droughts.

One of the main issues confronting the Department has been the excessive accumulation of flex account credits. Because of this accumulation, most right holders may exceed their farm's maximum annual groundwater allotment and yet continue to be in compliance with the farm's conservation requirements. Under the Historic Cropping Program, flex account credit accruals are limited and more efficient on-farm water management practices are encouraged. During the third management period, the Department will examine whether additional alternative programs, with limitations on flex account credits, should be developed as authorized by legislation from 1998. Two possible alternative programs that will be evaluated during the third management period include a cropped acreage program and a best management practices (BMP) program. These programs may provide a farmer the ability to grow crops that more closely reflect current market demands.

12.2.2.3 Industrial Demands and Issues

In the industrial sector, the main water users are turf-related facilities (golf courses, parks, schools, and common areas with 10 or more acres of high water use landscaping). These facilities have opportunities to improve in their water use efficiency. Efficient water use, coupled with direct use of effluent for turf irrigation, would help to achieve the AMA goals. While effluent use is encouraged within the AMA, there is only a limited supply. This is one reason that new turf-related facility use is not encouraged.

12.2.3 Other Issues and Challenges

The lack of a final court decree on the adjudication of surface water rights claims on the Santa Cruz River does complicate the effective implementation of assured water supply and other water management programs in the Santa Cruz AMA. During 1999, local water users with surface water rights claims have been discussing a possible surface water rights claims settlement that could be proposed to the adjudication court for the adjudication and ranking of surface water in the Santa Cruz AMA.

The geographic location and the hydrologic characteristics of the Santa Cruz AMA have limited the development of augmentation projects in the AMA. Many of the current augmentation mechanisms developed in the Second Management Plan were designed to introduce a variety of renewable water supplies, in particular Central Arizona Project (CAP) water, to water users in central Arizona, a sizeable distance away from the Santa Cruz AMA.

The water supply augmentation alternatives available to the Santa Cruz AMA are limited. During the third management period, mechanisms must be generated to effectively develop the sources of water available. One of these mechanisms could be the creation of a water district that could help in moving water from the sources of supply to the areas of demand.

The creation of a replenishment authority or water district has been suggested in several forums, most recently by a group representing surface water interests in the AMA. The district would have the responsibility for maintaining continuously available supplies to meet the needs of basin water users and to achieve consistency with management goals. Such a management entity is envisioned as able to contract for Mexican effluent, contract with agricultural users to "fallow" lands during drought cycles, and assist in the severance and transfer of water rights for assured water supply purposes. Creation of any district will

require specific legislation. The Department is committed to working with the community toward refining concepts and developing legislation to create at least the first phase of any necessary authority. To get to that point, however, a better understanding of the potential outcome of an interim surface water rights adjudication decree and the assured water supply determination process will be needed.

One of the water management tools that the Department has available is the general well spacing rules. The Department evaluates applications to drill new, "non-exempt" wells, or replacement "non-exempt" wells in new locations through general well spacing rules. Approval is granted only if the director determines that the proposed well ". . . will not unreasonably increase damage to surrounding land or other water users from the concentration of wells."

The Older Alluvium is the most laterally extensive water-bearing formation in the Santa Cruz AMA, extending miles out from the Santa Cruz River and its tributaries. While new municipal or industrial production wells or major new subdivisions are not causes of concern, the sale of 40-acre plots are. These 40-acre parcels could each be divided into eight five-acre parcels, a trend which has been noted in the AMA. If each five-acre parcel drilled one exempt well and withdrew 10-acre feet per year, water supplies could be quickly reduced and safe-yield conditions could become very difficult to maintain. Water tables in the Older Alluvium would decline with uncertain consequences for stream flow and water tables in the Younger Alluvium.

The statutes require the Santa Cruz AMA to include in its management plan for the third management period "criteria for the location of new wells and replacement wells in new locations consistent with the management goal of the active management area." A.R.S. § 45-566(A)(11). The Department's objective in including additional well spacing criteria in the Santa Cruz AMA Third Management Plan is to avoid negative impacts from the drilling of new wells or replacement wells in new locations under safe-yield conditions, to avoid long-term declines in local water table levels, protect other water users, and preserve the hydrologic balance. Certain types of wells, such as mineral exploration wells, geotechnical wells, monitor wells, and peizometers, are excluded from these well spacing rules. These types of wells do not pump significant volumes of water and are, therefore, excluded from the well impact rules and only require notices of intention to drill or groundwater withdrawal permits. As greater understanding of the hydrology of the AMA is achieved the Third Management Plan well spacing criteria may be modified.

12.3 WATER MANAGEMENT CHALLENGES IN THE SANTA CRUZ ACTIVE MANAGEMENT AREA

The Third Management Plan programs were developed within current statutory guidelines; however, as described in chapters 8 and 11, implementation of the conservation measures outlined in chapters 4, 5, and 6 will not go far enough to ensure sufficient water supplies for current and committed demands into the future. New and innovative management tools for quantification and clarification of water rights and new sources of supply will need to be developed to achieve the AMA goals. Chapter 11 outlines the volume of supply needed to ensure sufficient supplies even in times of drought. Chapter 11 also indicates the volume of water that might be available to be retained and stored during storm flow events if storage capacity in the AMA is increased and water moving through the AMA could be slowed to allow increased percolation to the water table.

To meet the AMA goals, new uses of water within certain areas of the Santa Cruz AMA will need to be offset either by replenishment of water withdrawn or through a corresponding reduction in water use by existing users. Replenishment could be through some mechanism to purchase recharge credits or in some circumstances by a demonstration that water pumped out of storage will be naturally recharged. Reduction in existing use could be achieved by discontinuing existing water use in the same local areas in which a new demand begins. Water that is conserved through increased efficiency could, in part, be taken up by a new use.

12.3.1 Coordinated Management of Surface and Groundwater

The legislature has mandated that management of groundwater and surface water rights be coordinated in order to achieve the AMA goals. This will likely result in a high degree of water management awareness by the local water right holders in the Santa Cruz AMA. To successfully manage water supplies for the Santa Cruz AMA, groundwater programs cannot be implemented without examining the consequences to surface water rights, and surface water rights cannot be obtained or altered without examining the consequences to groundwater programs and overall water management efforts and the public interest. Where the law allows the Department to consider these consequences in making its decision, the Department will do so.

Surface water rights in the AMA have not yet been adjudicated and under current procedures may not be adjudicated for many years. In March 1999, the AMA Settlement Group presented to the Department a set of proposed concepts for an assessment which would ultimately lead to an interim surface water rights decree for the AMA in advance of an adjudication. A water rights decree is very helpful for determining the legal and physical availability of water in assured water supply requests. The Department supports the Settlement Group's efforts to resolve these rights in a timely and equitable manner that meets the water management needs of the AMA.

Unlike other AMAs, the Santa Cruz AMA is largely dependent on surface water subflow as a source of supply, and there is a close connection between surface water and groundwater systems. In addition, there is limited storage in the aquifers underlying the Santa Cruz River and fluctuating water levels in portions of the Younger Alluvium of the Santa Cruz River where most of the region's water supply is located, making this source of supply highly susceptible to drought.

Shallow depths-to-water and small aquifer storage capacity produce rapid and dramatic fluctuations in water levels. Although this could be viewed as safe-yield when accounting for a long-term average of water conditions, the immediate impacts of water shortages extended over just a short period can be significant. This hydrologic reality also hinders the ability to accurately forecast future demands and supplies in the Santa Cruz AMA.

Although the laws governing surface water and groundwater are distinct, they are not necessarily at cross-purposes. An effective coordinated management of surface and groundwater must provide the mechanisms to protect the water rights held under both legal authorities.

12.3.2 International Water Issues

The international nature of the Santa Cruz AMA water resources requires binational coordination of water management efforts. The Santa Cruz River is one of the main water supply sources for Nogales, Sonora and for Nogales, Arizona. The water management policies of Nogales, Sonora, in regard to the use of the Santa Cruz River, may have a direct impact on the volume of water entering the Santa Cruz AMA. Additional pumping of Nogales, Sonora Santa Cruz River well fields could reduce both small flood flows and sub-flow, thereby reducing the recharge in the Santa Cruz AMA.

One key component of water management decisions in the Santa Cruz AMA depends on knowing the fate of current and future effluent discharge from Mexico. This effluent is an important portion of the overall balance of the hydrologic system in the AMA. Mexico currently has a legal right, through treaty agreement, to recover their portion of the treated effluent before it is discharged to the river. Although Mexico has not initiated efforts to recover the effluent, the uncertainty of Mexico exercising its right to recapture the effluent compounds the dilemma of whether or not this resource will be available to the AMA in the future.

The Department is participating in a binational facilities planning process that is challenged with finding an integrated solution to wastewater treatment problems in both Nogales, Sonora and Nogales, Arizona. A very important portion of the planning involves the effluent discharge from the NIWWTP. This effluent is generated by Nogales, Sonora and Nogales, Arizona. Roughly two-thirds of the effluent entering the NIWWTP originates from Nogales, Sonora and is transported into the United States through a pipeline which runs under the Nogales Wash. After treatment, the effluent has been historically discharged into the Santa Cruz River. This discharge is a significant component of the incidental recharge in the Santa Cruz River aquifer. Since the plant began operation in the 1960s, water levels have risen in the local water tables downstream from the plant.

There are several varying opinions of what approach the AMA should take in the planning of water resources downstream from the NIWWTP. Some opinions suggest that since the effluent has been historically discharged it will continue in the future. Another opinion is that the effluent has generated a rich riparian habitat and that most of the water that the riparian vegetation is consuming is water discharged from the plant, which limits recharge to the local aquifers. Another view is that in the future more effluent will be available from the continuous urban development on both sides of the border. All of these opinions raise valid concerns which the Department will work to address during the third management period. The Department will seek agreements with Mexico to further secure the supply of effluent. U.S. federal agencies are interested in reducing their subsidy to Mexico for treatment costs, which might be met by a replenishment district in the Santa Cruz AMA. Presently, federal money is being used to upgrade and expand the NIWWTP, to upgrade water systems, and possibly to build treatment capacity in Mexico.

12.3.3 Development Pressure

The City of Nogales and Rio Rico are the two biggest water users in the municipal sector. They have been growing at the rate of 5 to 8 percent per year for the last 10 years. If this rate of growth continues during the third management period, creative water management policies will be required to maintain the AMA goals and meet the new water needs.

During the third management period, greater development pressure may be coming from the north. Expansion of existing development in the Green Valley area is headed south. This development is already at the northern boundary of the Santa Cruz AMA and is expected to continue during the third management period. This type of development (residential with associated golf courses) requires the use of substantial amounts of water.

Development pressures probably will continue throughout the third management period. The local authorities (City and County) have the tools to direct and decide how this development will occur. The Department intends to maintain open communications with these authorities and will continue to provide advice on water supply issues related to development.

The Department has concerns about the possible future conversion of agricultural lands for development in the Santa Cruz AMA. Currently, agricultural water right holders are not using their full water allocations. These rights could be converted to residential use and be fully utilized by municipal users. The possible conversion of agricultural lands to municipal development could remove a vital source of incidental recharge and result in an increase in demand on the aquifers in the AMA.

There is an increasing concern about the development of dry-lot subdivisions in the Santa Cruz AMA. In this type of subdivision, each lot gets its water supply from an exempt well. Concentrations of exempt well demand often occur in the same general area as municipal demand. Exempt wells are usually located near the Santa Cruz River and other tributaries and away from hard rock areas. The pumpage associated with a

cluster of several small wells within the same basin could potentially withdraw a similar volume as a single large well.

Concentrations of new exempt wells could potentially make it more difficult to achieve the AMA goals due to the possible effects of concentrated withdrawals and the lack of authority to regulate or even monitor information on the water use patterns from these wells. The dry-lot subdivisions also frequently have septic systems as a means of disposal of raw sewage. In some areas in the AMA, this may result in water quality problems due to shallow water tables. Finally, there is no potential to collect wastewater for water reuse in a dry-lot subdivision using septic systems.

A remaining issue that needs to be explored during the third management period is the potential to design a conservation program for private water companies that meets both the Arizona Corporation Commission (ACC) standards and the AMA water management goals. The Department will continue to work with the ACC in the development of policies related to water conservation and supply acquisition and on conditions for appropriate recovery of costs associated with the Department's regulatory programs.

12.3.4 Development of Technical Data and Tools

The Department continues to devote considerable resources to the development of the groundwater flow model for the AMA. In terms of the number of model cells, it is the largest flow model yet developed by the Department with 10 times the number of model cells as the Salt River Valley model. Due to its complicated nature, a considerable amount of detail is necessary to accurately simulate the hydrologic system. This work will help in conceptually understanding some of the relationships between the Younger and the Older Alluvium.

In addition to the groundwater flow model, the Department has now begun development of a surface water model for the AMA. This model will be able to compute inflows and outflows for every defined segment of the Santa Cruz River system. Instead of predicting water levels, the model balances water demands and inflows taking into account agricultural and municipal diversions, surface water claims, evapotranspiration, storage, and other factors. Once the model is running and calibrated, it could become an important tool in evaluating the effects of existing and future water claims on the river. This could help the settlement negotiations considerably.

The available information on the hydrologic characteristics of the Older Alluvium and its potential as a water source for the Santa Cruz AMA is very limited. Few high production wells are located in the Older Alluvium and the exempt wells located there are not required to provide water use characteristics to the Department. The Older Alluvium stores large amounts of water, but it does not usually transmit large quantities of water to wells. Further exploration to find areas with high water yield and storage capacity would be useful. The Department intends to direct more attention to developing a better understanding of this hydrogeologic unit during the third management period.

12.3.5 Development of Assured Water Supply Criteria

A major work effort will be initiated to establish the assured water supply criteria for evaluating the statutory requirement that issuance of an assured water supply must be consistent with the AMA goals. In order to develop the appropriate criteria, it is necessary to have: (1) a better understanding of the impact of diversions at specific locations of the subflow water levels; (2) a better understanding of the impact of the effluent introduced into the system and its long-term availability; (3) a better understanding of how effluent, surface water flows, and mountain front recharge affect Younger Alluvium water levels; and (4) a formal determination of the nature, validity, and priority of surface water rights in the context of their usage in supporting an assured water supply determination.

The assured water supply standards in the Santa Cruz AMA could significantly differ from those in place for other AMAs. For the other AMAs, the rules are focused predominantly on limiting groundwater withdrawals from deep, basin-filled aquifer systems that have been experiencing significant depletion. The current assured water supply standards for those AMAs allow for significant localized groundwater mining (to 1,000 feet below land surface).

In the Santa Cruz AMA, the majority of the water use is in the Younger Alluvium and its tributaries. One portion of the Santa Cruz AMA goal seeks to maintain local water tables. While water may be "physically available" to an entity, the goal of maintaining the water level could significantly limit allocation of water for new development. A major challenge in developing the assured water supply standards for the Santa Cruz AMA's unique hydrologic system will be to determine the volume of water that can be removed from the system without allowing long-term water table declines while taking into consideration the natural fluctuations in supply and demand and current water rights.

The Department is beginning the process of drafting rule criteria for the AMA. Final adoption of these rules will reflect community and stakeholder input to the highest degree possible. We expect to have an initial conceptual draft available for discussion before the end of 1999. These rules will likely need to be modified in the future years as the program evolves.

12.3.6 Augmentation/Recharge Limitations

The hydrogeologic characteristics of the aquifers in the Santa Cruz AMA and their close relationship with surface water flow presents a challenge to augmentation and recharge that needs to be addressed with innovative approaches. Effluent discharge from the NIWWTP is a major source of recharge in the AMA, and it is a significant source of water available to support future assured water supply determinations. Additionally, the effluent plays a major role in maintaining water tables and riparian habitat in the Younger Alluvium downstream of the NIWWTP.

Any proposed recharge facility must be hydrologically feasible. In the Santa Cruz AMA, the main concern relative to hydrologic feasibility is the lack of storage capacity in the Younger Alluvium. In addition, water that is recharged in the Younger Alluvium may eventually flow out of the AMA. Any recharge water that leaves the AMA would be debited from the long-term storage account of the water stored. In the Santa Cruz AMA, there are two key issues that must be resolved in the accounting of storage credits. One issue is whether or not the recharge statutes allow credits to be earned for water recharged in a surface water system. The second issue is how the Department will quantify how much of the recharged effluent leaves the AMA in order to deduct that amount from the credit account.

Historically, the major challenges of water management in the desert have required creative, innovative solutions. These are attributes which Arizona communities and state government have successfully used thus far. These attributes will continue to be important as we face a future of population growth and intensifying competition for limited water resources.

12.4 STRATEGIES FOR THE THIRD MANAGEMENT PERIOD

The Department, in conjunction with the Santa Cruz AMA Groundwater Users Advisory Council (GUAC), has solicited the local community's interpretation of the water management goals established by the legislature. The Department intends to continue an open dialog with the local water users and the community in general during the third management period.

The Department's water management programs will be focused on protecting the overall balance between water use and replenishment of the underlying aquifers and on accommodating short-term fluctuations in water tables due to climatic conditions.

The Department intends to concentrate water management efforts on the Younger Alluvium of the Santa Cruz River and those tributaries and formations that contribute water to the Younger Alluvium, based on the input from local water interests, and because most of the critical water management issues are centered upon the Younger Alluvium of the Santa Cruz River.

The Department will continue to implement the AWS Rules to require new subdivisions to use renewable supplies and to be consistent with both the safe-yield and the local water table goals. For the Santa Cruz AMA, this primarily means the use of a surface water right which has been severed and transferred to the new use.

The assured water supply and well spacing programs are some of the tools that the Department intends to use to prevent negative impacts of new non-exempt wells on existing water right holders and the AMA's safe-yield and water table goals. During the third management period, the Department will continue working to improve the understanding of the potential impact of exempt wells on neighboring supplies and the riparian areas.

The Department is developing a computer groundwater model and gathering hydrogeologic information to get a better understanding of the hydrologic systems in the AMA. This groundwater model will be a valuable tool in guiding the decisions of water users and the Department during the third management period. The Department intends to develop coordinated management of surface water and groundwater by adapting the existing programs or by developing new management approaches over the next 10 years.

The Department will continue to represent the AMA's interest in the facility planning negotiations and seek mutually beneficial agreements with Mexico to further secure the supply of effluent.

12.4.1 Water Conservation-Related Strategies

To enhance the Department's water conservation efforts, the Department will investigate the need for the development of additional alternative agricultural conservation programs during the third management period.

The Department will also continue to monitor crop and water use patterns during the third management period to evaluate agriculture's contribution to meeting the Santa Cruz AMA goals and the impacts of the Department's programs on farming operations. Urbanization impacts on agriculture as well as water use trends due to agricultural market conditions will be evaluated for future planning needs.

The Department will investigate the need for legislative changes to enhance the Department's conservation efforts and the impact on farming operations.

The Department will work to improve data collection and analysis of municipal growth patterns, continue to search for the best available technology in residential and non-residential water use, and further quantify what a reasonable goal is for future reductions in municipal water use. The Department will evaluate the contribution of the municipal sector on the achievement of the AMA goals and continue to explore the possibility of developing a separate private water company program in coordination with the Arizona Corporation Commission. The Department will persist in the development of water management tools to assist the water users in the Santa Cruz AMA to achieve its goals and preserve the quality of life.

A significant increase in the volume of water withdrawn from wells, particularly in the Younger Alluvium of the Santa Cruz River, may prevent the maintenance of safe-yield conditions and result in long-term declines in local water table levels. The current Code provisions may need to be modified to allow the Santa Cruz AMA to most effectively use conservation to manage for its dual goals.

A stronger conservation-oriented technology and water management practices requirement for turf-related facilities should be considered from both a regulatory and non-regulatory approach. From a regulatory perspective, application rates which determine the maximum annual water allotments need to be further scrutinized under actual field conditions. Conservation technologies and practices should be further evaluated as well. From a non-regulatory approach, increased conservation and augmentation education could assist turf managers with water management practices, evaluation of effective water conservation technology, and construction of effluent conveyance infrastructure.

The turf facilities make up the majority of the water demand in the industrial water use sector. The Department will continue the turf conservation program based on a maximum annual allotment for each facility and reduction of turfed acreage incentives. The Third Management Plan will provide incentives for the use of effluent by turf facilities. The Department will continue to provide additional conservation assistance and education for increased water management efficiency.

12.4.2 Water Supply Strategies

Recharge will be an important feature of any plan designed to meet the AMA management goals. However, statutory, physical, financial, and institutional constraints must first be addressed and resolved. An ideal solution would likely involve a combined approach whereby some effluent is recharged in constructed facilities near demand centers, some is directly reused for irrigation or turf watering, and the remainder is recharged to the river to support the riparian habitat and recharge the aquifer for downstream uses. A regional water management entity such as that described in Chapter 8 could assume responsibility for operating these projects with the objective of balancing competing water needs.

New water demands and the uncertain future availability of Mexican effluent highlight the need for the local community to work together with the Department to secure this and other renewable supplies, where available, to achieve and maintain the management goals of the Santa Cruz AMA. The Department is and will continue lending its technical expertise and full resources to the exploration of solutions to the water resource management concerns of the Santa Cruz AMA community.

In addition, the Department will support funding for water conservation and augmentation education and the direct use of effluent supplies in order to meet the water management goals of the Santa Cruz AMA. These monies may be used to assist farmers with irrigation water management practices and for the infrastructure to convey renewable water supplies to farms.

12.4.3 Recharge/Augmentation Strategies

During the third management period, several augmentation measures will be explored including: (1) the evaluation of recharge sites in the Santa Cruz AMA; (2) possible water exchanges through state mechanisms such as the Arizona Water Banking Authority; (3) helping the AMA community explore the possibility of securing future effluent flow from Mexico, probably through the assistance of a locally created replenishment district; and (4) the possible use of existing renewable supplies within the AMA such as water from Patagonia Lake.

Ultimately, it is the Santa Cruz AMA community, however, that will determine what augmentation measures are needed to assure adequate water supplies in the future. By developing avenues from which local water interests can work together to promote improved water resource management and secure the long-term availability of water supplies to support existing and new development, the Department can help the Santa Cruz AMA successfully maintain the conditions set forth in its management goal.

12.4.4 Water Management Assistance Strategies

Additional research is needed on the effectiveness of water conservation programs. To the extent feasible, the Department will assist in designing follow-up studies and analysis to evaluate program effectiveness. This may be assisted through some funding from the Water Management Assistance Program for municipal research or evaluation projects. Throughout the third management period, the Department will work to improve water use data collection to support both planning and conservation program evaluation efforts. The Department will also continue to provide direct conservation assistance to water providers to help them in meeting their regulatory requirements.

The Third Management Plan will place a greater emphasis on studying replenishment options and expanding monitoring programs to assist in solving the unique water management problems of the Santa Cruz AMA and to increase public awareness of the importance of replenishment, monitoring, and water conservation. The Department, in consultation with the GUAC, will identify augmentation and replenishment, monitoring, and conservation assistance projects with the highest priority. These projects, through applications or Department initiative, will receive "first funding" status. Additionally, the Department will list other priority projects and categories for technical or funding assistance. Applications in this priority category will compete with all other applications; however, preference points will be given to the priority applications.

12.4.5 Well Spacing Strategies

The Department will evaluate new non-exempt wells and replacement wells in new locations based on the hydrologic impact analysis submitted by the applicant and the most recent hydrologic data for the local area. If, at any time until the management plan well spacing criteria are finalized through a modification of the plan, the Department determines that a proposed well will have a negative effect on the maintenance of local water table levels and safe-yield conditions, the Department may refuse to issue the permit unless the applicant can demonstrate through a hydrologic study that the proposed well will not have a negative impact on the AMA goal.

The Department will continue evaluating new and existing hydrologic data pertaining to the potential impacts of exempt wells. Exempt wells have the capacity to pump 35 gallons of water per minute or less and may pump no more than a total of 10 acre-feet per year. Exempt wells are not regulated for water conservation, are not required to measure and report withdrawals, and are not subject to the Department's well spacing criteria.

12.4.6 Replenishment/Water Authority

The Department is committed to work with the community toward refining concepts and developing legislation to create at least the first phase of any necessary authority. To get to that point, however, a better understanding of the potential outcome of the surface water rights decree and assured water supply determination process will be needed.

12.4.7 Surface Water Rights

The Department supports the Settlement Group's proposed concepts for an assessment which could lead to an interim surface water rights decree for the AMA in advance of an adjudication. The Department is committed to continuing to work with all parties in the AMA toward completing a resolution of the water rights claims in the basin.

12.5 CONCLUSIONS

The creation of a successful management program will depend on the cooperation and commitment of all participants - government entities at local, state, federal, and international levels; water users; water providers; and the community - in refining goals, developing tools, and implementing program features. This complex effort will require several years to complete. The Department is firmly committed to working with interested parties and to dedicate the necessary resources to get the job done. We anticipate that several milestones or interim targets will need to be set along the way as we progress.

The limited water resources available in the Santa Cruz AMA will require efficient use of water by all the water use sectors. A continuous dialog with Mexican water agencies to find mutually beneficial management alternatives for the Santa Cruz River will be required. The exploration of recharge and augmentation possibilities will be a key tool to meet the AMA goals.

The Department's participation and assistance to the surface water users in reaching a settlement in their surface water claims is very important since the lack of a final court decree on the adjudication will affect the implementation of several water management programs in the AMA.

The comprehensive gathering of hydrologic information is of great importance to better develop the groundwater and surface water models that will provide information to assist in making water management decisions in the AMA.

A united position from the Department and the water users in the AMA will be required if new legislation is desired to address some of the water management issues in the Santa Cruz AMA.